Rapid Ecological Assessment (REA) Survey Methodology:

#1. Fish Surveys

Coral Reef Ecosystem Program (CREP)

January 2016

Stationary Point Count (SPC) – Overview

The SPC is a method based on taking a “snapshot” of how many (and what kind, and what size of) fishes are present in a given area at *one* instance in time.

This is challenging because time is limited so we use a standardized approach to search, identify species and estimate their length, in a controlled step-by-step manner.

This allows for a more thorough survey and addresses issues relating to fish behavior and range on a reef or other habitats.

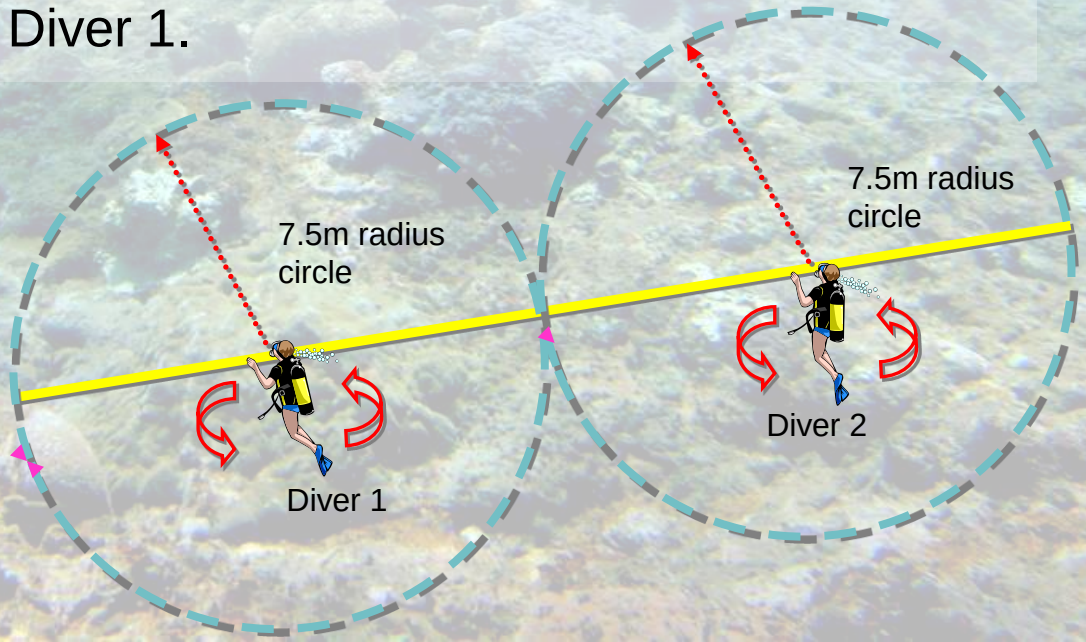
Stationary Point Count (SPC) – Overview

A single complete survey is conducted by 2 divers in adjacent, 7.5m radius cylinders and consists of the following:

1. **Fish survey**: Fishes are counted and sized with the goal of capturing the biomass of all the fish in the cylinder during a "snapshot" in time;
2. **Benthic habitat survey**: Divers then estimate benthic cover, substrate height, and urchin density in their cylinders, and habitat type of the general area;
3. **Digital benthic photos**: At the end of the surveys, photos are taken along the transect line by Diver 1.

This presentation focuses only on fish surveys.

Benthic surveys and photo information are covered in the presentation "#3 Benthic Habitat Surveys."



Stationary Point Count (SPC) – Overview

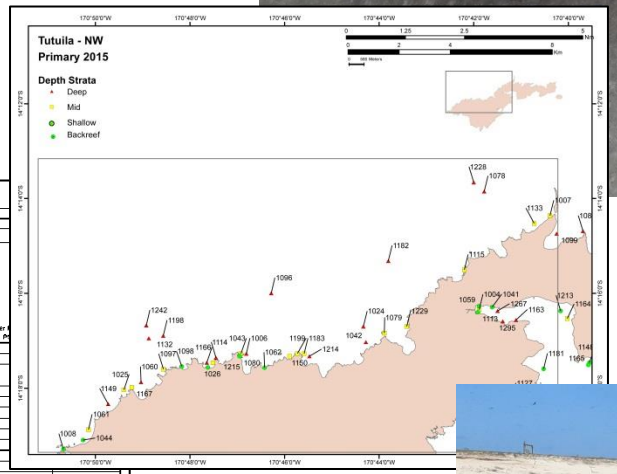
Here's what will be covered:

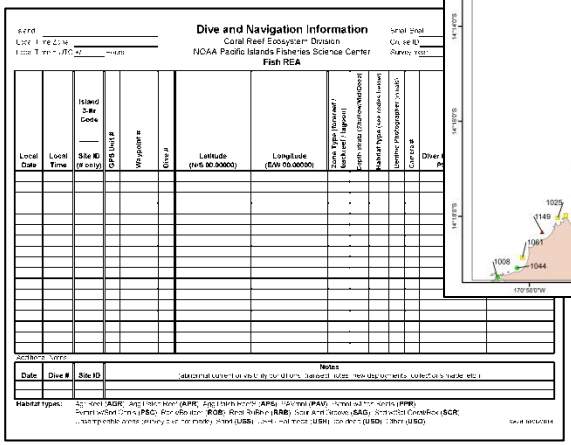
- Equipment
- Site selection
- Types of fish data
- Uses of fish data
- Data collection
  - Basics
  - Examples
  - Highly mobile species
  - Presence data
- Review
- Additional tips and rules

Equipment

Logistical

- Surfer marker buoy and reel
- GPS unit w/sites preloaded
- Map of sites
- Dive/Navigation sheet

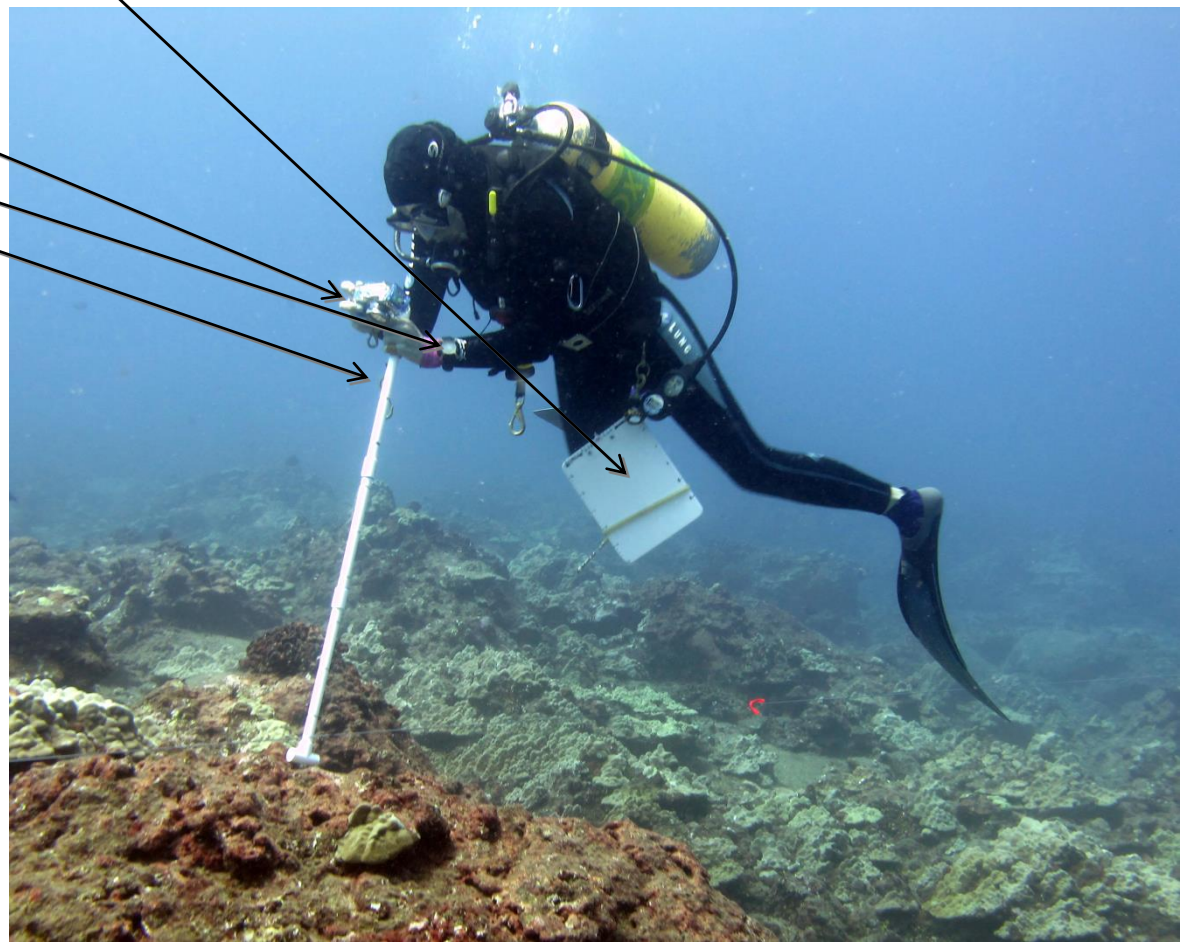




Equipment

Survey

- Underwater slate, and data sheet
- Camera
- Watch
- Meter stick
- 30m transect reel



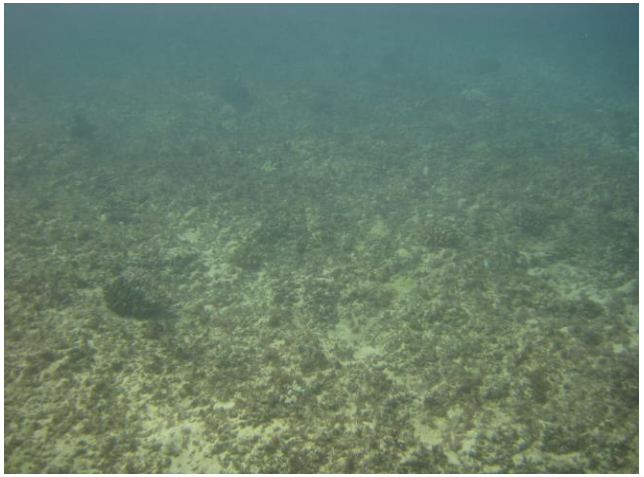
Site selection

Locating and assessing the sample site

- Navigate to predetermined site coordinates (GPS waypoints) in the designated depth strata (shallow: 0-6m, moderate: 6-18m, deep: 18-30m).
- Look for suitable habitat (should be ~ 50% hardbottom, i.e. not sand flat).
- Alternate sites. If primary site not suitable, make a note on the Dive Navigation Sheet and proceed to an alternate site.

Site selection

Suitable habitat

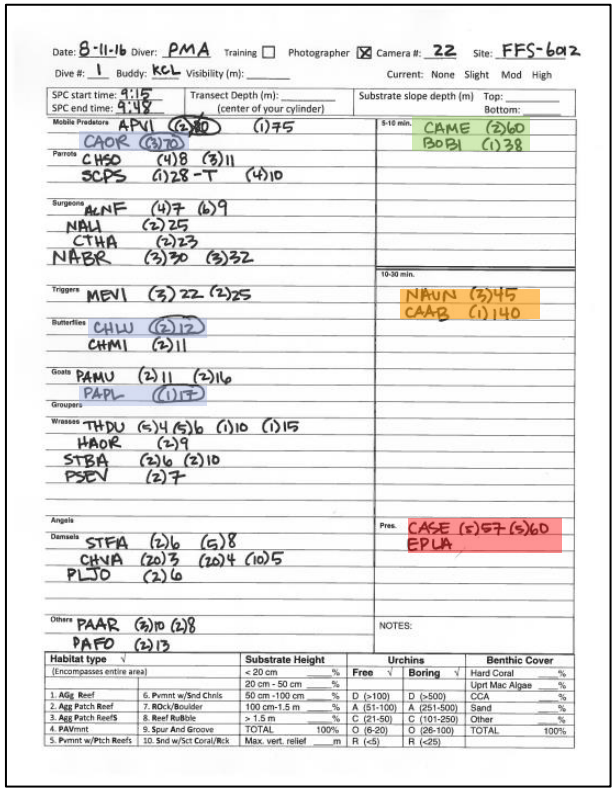


Unsuitable habitat

Types of fish data

You will identify, count, and size all of the fish in your cylinder, recording the data in slightly different ways. Because the methods we use to do this are consistent, the data can be filtered appropriately for analysis.

- **Instantaneous (I)**
- **Non-instantaneous (N)**
- **5-10 min (F)**
- **10-30 min (T)**
- **Presence (P)**

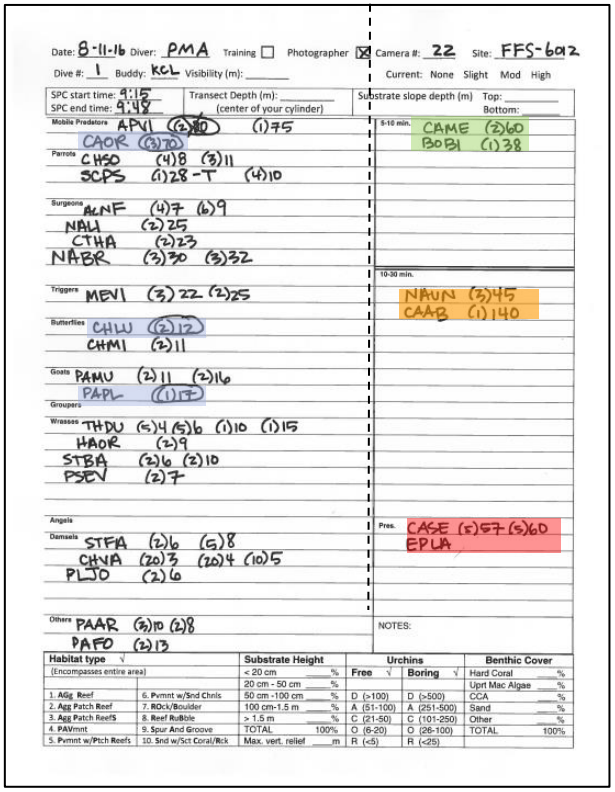


Types of fish data

LEFT SIDE:

Make the fish seen during the first 5 minutes your priority, especially if you're new.

- **Instantaneous (I)**
- **Non-instantaneous (N)**



RIGHT SIDE:

The fish seen after the first 5 minutes are important, but supplemental data.

- **5-10 min (F)**
- **10-30 min (T)**
- **Presence (P)**

P data especially is gathered opportunistically.

Uses of fish data

It's not a requirement to know HOW the different types of data are used, though it may be helpful.

It IS important that everyone collects the data the same way.

- **Instantaneous (I)**
  - Uses: Fish density per unit area, size structure
- **Non-instantaneous (N)**
  - Uses: Fish density, size structure
- **5-10 min (F)**
  - Use: Fish density, size structure
- **10-30 min (T)**
  - Use: Size structure
- **Presence (P)**
  - Uses: Size structure, species lists

For more information, see the "CREP Standard Operating Procedures (SOP) Manual under "Reference Materials" in the Survey Method Training materials.

Data collection

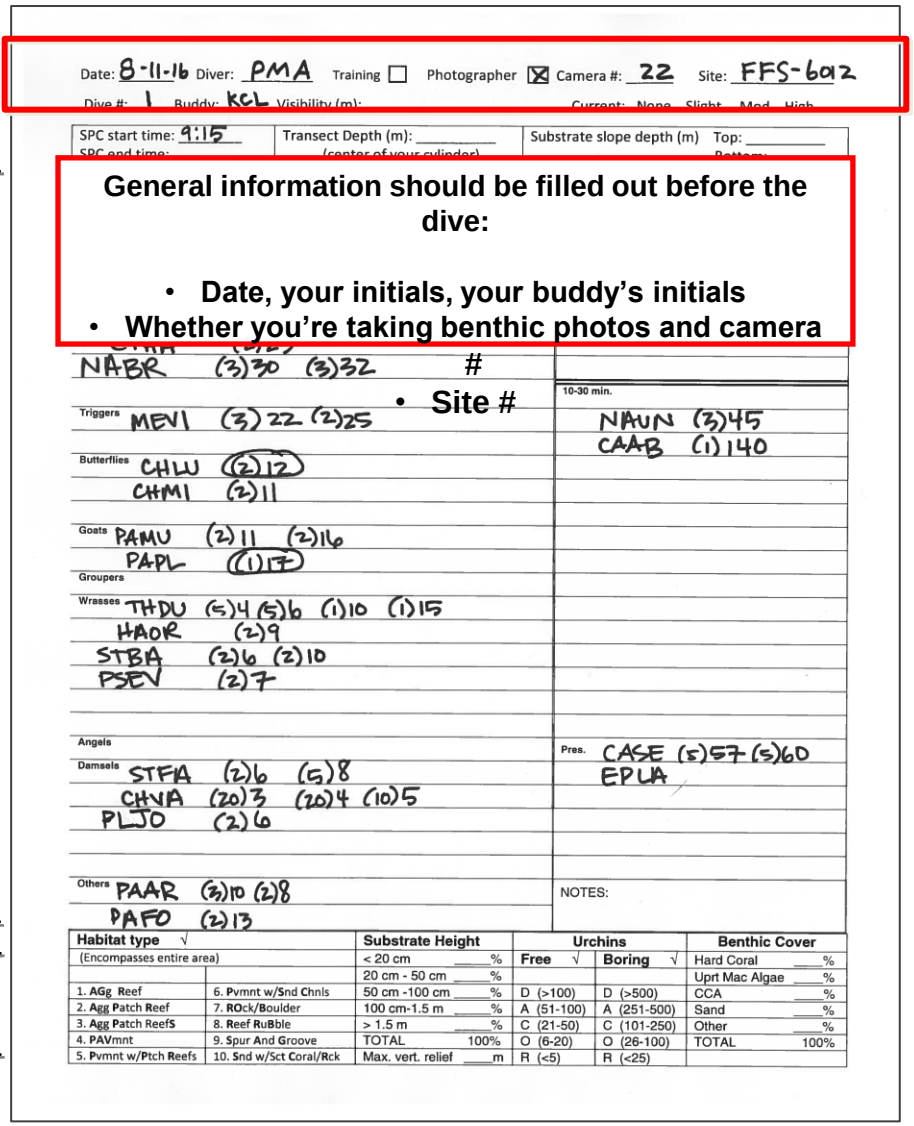
Fish and habitat data sheet

Survey data

Fish data

Benthic data

Fish species are recorded using 4-letter codes based on the first 2 letters of the fish genus and the first 2 letters of the species (though there are exceptions).



Date: 8-11-16 Diver: PMA Training ☐ Photographer ☒ Camera #: 22 Site: FFS-6012

Dive #: 1 Buddy: KCL Visibility (m): Current: None Slight Mod High

SPC start time: 9:15 | Transect Depth (m): (center of your cylinder) | Substrate slope depth (m) Top: Bottom:

General information should be filled out before the dive:

- **Date, your initials, your buddy's initials**
- **Whether you're taking benthic photos and camera #**
- **Site #**

NABR (3)30 (3)32

Triggers MEVI (3)22 (2)25

Butterflies CHLU (2)12
CHMI (2)11

Goats PAMU (2)11 (2)16
PAPL (1)17

Groupers

Wrasses THDU (5)4 (5)6 (1)10 (1)15
HAOR (2)9
STBA (2)6 (2)10
PSEV (2)7

Angels

Damsels STFA (2)6 (5)8
CHVA (20)3 (20)4 (10)5
PLJO (2)6

Others PAAR (3)10 (2)8
PAFO (2)13

10-30 min.
NAUN (3)45
CAAB (1)140

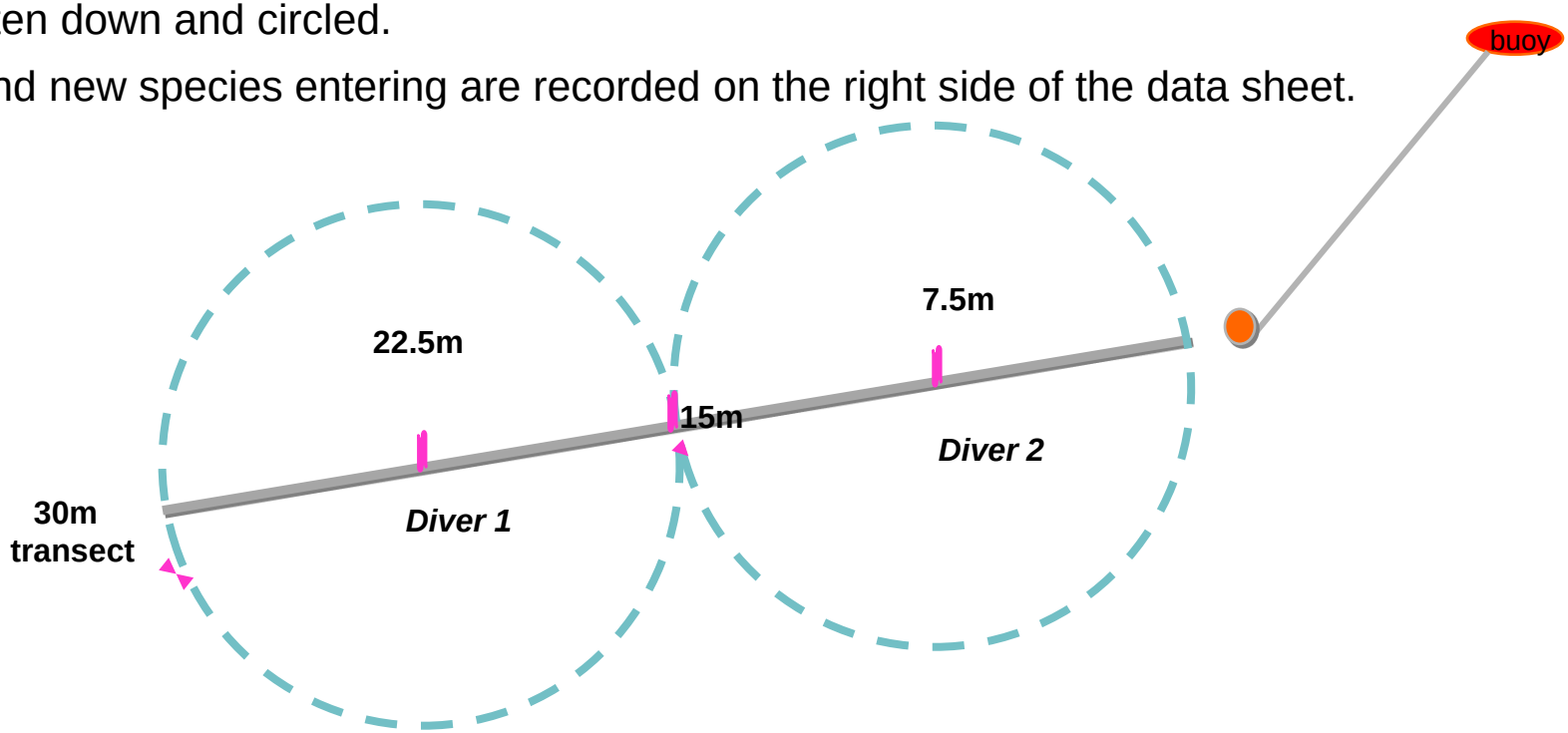
Pres. CASE (5)57 (5)60
EPLA

NOTES:

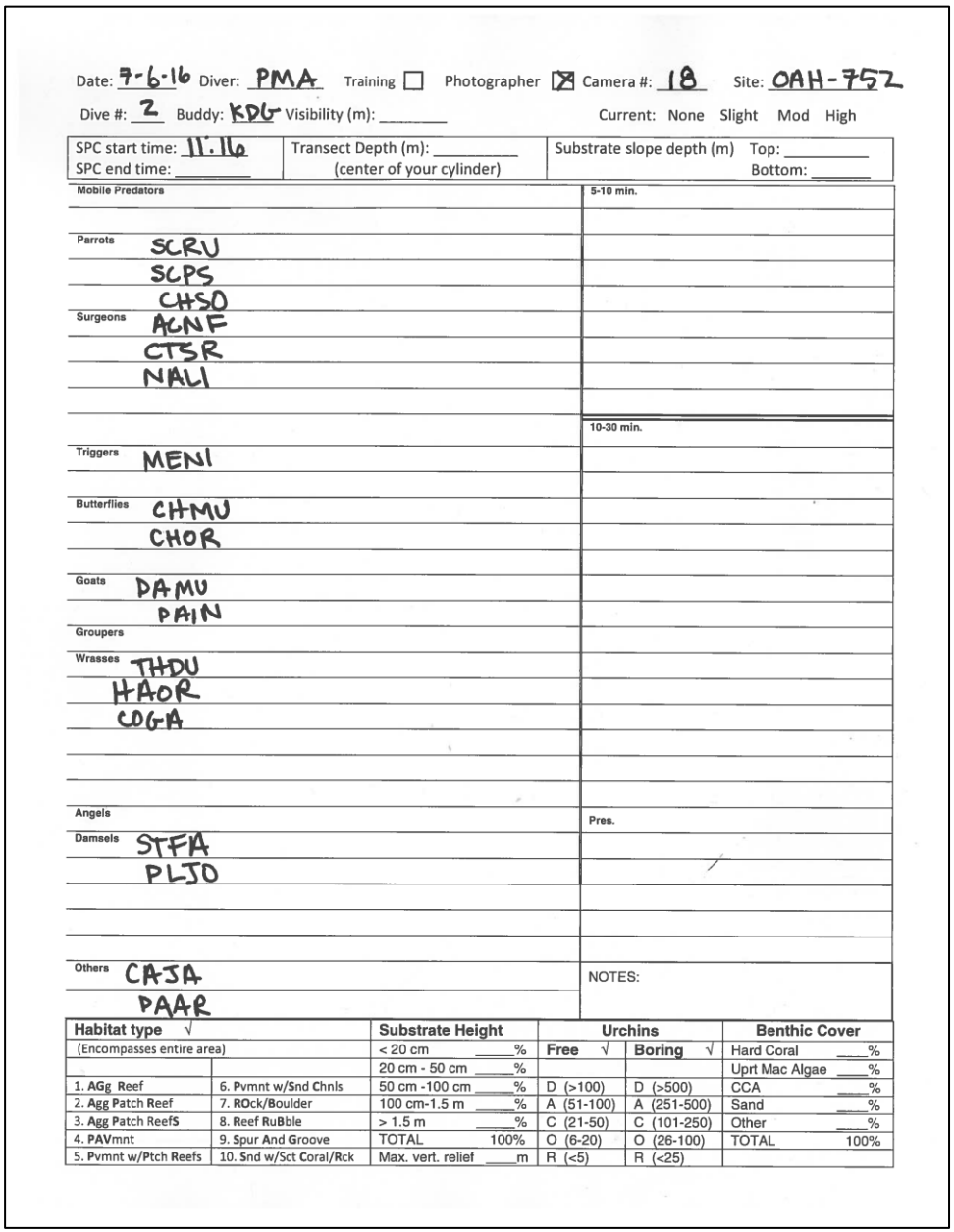
Habitat type √ (Encompasses entire area)		Substrate Height	Urchins Free √	Urchins Boring √	Benthic Cover
		< 20 cm ___%			Hard Coral ___%
		20 cm - 50 cm ___%			Uprt Mac Algae ___%
1. AGg Reef	6. Pvmnt w/Snd Chnls	50 cm -100 cm ___%	D (>100)	D (>500)	CCA ___%
2. Agg Patch Reef	7. ROck/Boulder	100 cm-1.5 m ___%	A (51-100)	A (251-500)	Sand ___%
3. Agg Patch ReefS	8. Reef RuBble	> 1.5 m ___%	C (21-50)	C (101-250)	Other ___%
4. PAVmnt	9. Spur And Groove	TOTAL 100%	O (6-20)	O (26-100)	TOTAL 100%
5. Pvmnt w/Ptch Reefs	10. Snd w/Sct Coral/Rck	Max. vert. relief ___m	R (<5)	R (<25)	

Data collection - basics

1. Diver 2 sets the surface marker buoy; Diver 1 lays the transect along a single depth contour. The divers move to the center mark in their cylinder.
2. Divers give an “OK,” record the time and set their watches, and begin the survey.
3. First 5 minutes – Divers start a list of fish species observed, no counts or sizes
   - Exception: Highly mobile species unlikely to reappear
4. After 5 minutes – Divers again give “OK,” then go down species list, starting at top with Mobile Predators, counting & sizing individuals currently in their cylinder
   - If a species on the list is no longer present, the “remembered” size and count is written down and circled.
   - Brand new species entering are recorded on the right side of the data sheet.



Data collection – Example 1



Date: 7-6-16 Diver: PMA Training ☐ Photographer ☒ Camera #: 18 Site: OAH-752

Dive #: 2 Buddy: KDG Visibility (m): _____ Current: None Slight Mod High

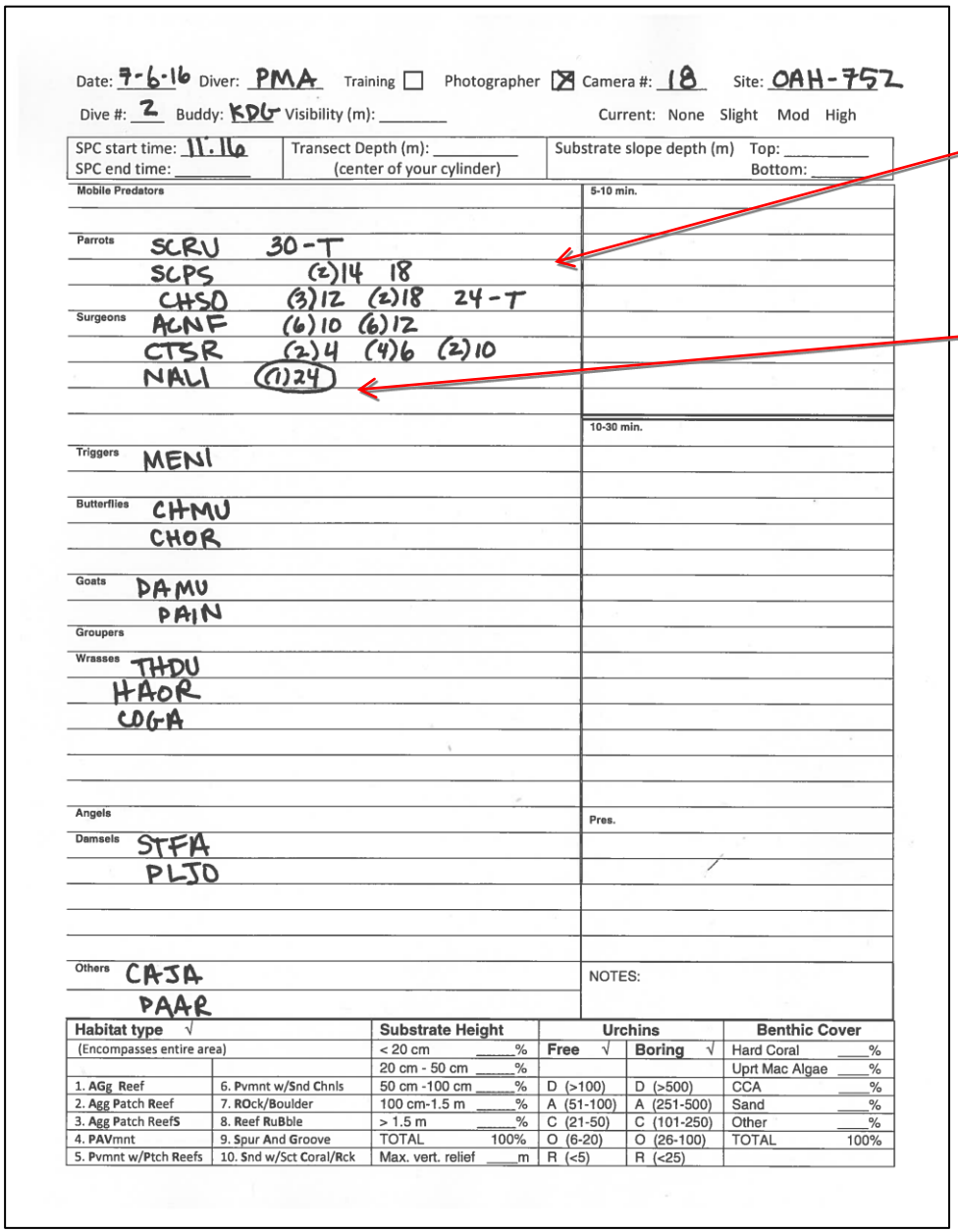
SPC start time: 11.16 SPC end time: _____	Transect Depth (m): _____ (center of your cylinder)	Substrate slope depth (m) Top: _____ Bottom: _____

Mobile Predators		5-10 min.	
Parrots	SCRU		
	SCPS		
	CHSO		
Surgeons	ACNF		
	CTSR		
	NALI		
		10-30 min.	
Triggers	MENI		
Butterflies	CHMU		
	CHOR		
Goats	PAMU		
	PAIN		
Groupers			
Wrasses	THDU		
	HAOR		
	COGA		
Angels		Pres.	
Damsels	STFA		
	PLJO		
Others	CAJA	NOTES:	
	PAAR		

Habitat type √		Substrate Height	Urchins		Benthic Cover	
(Encompasses entire area)		< 20 cm ____%	Free √	Boring √	Hard Coral	____%
		20 cm - 50 cm ____%			Uprt Mac Algae	____%
1. AGg Reef	6. Pvmnt w/Snd Chnls	50 cm -100 cm ____%	D (>100)	D (>500)	CCA	____%
2. Agg Patch Reef	7. ROck/Boulder	100 cm-1.5 m ____%	A (51-100)	A (251-500)	Sand	____%
3. Agg Patch ReefS	8. Reef RuBble	> 1.5 m ____%	C (21-50)	C (101-250)	Other	____%
4. PAVmnt	9. Spur And Groove	TOTAL 100%	O (6-20)	O (26-100)	TOTAL	100%
5. Pvmnt w/Ptch Reefs	10. Snd w/Sct Coral/Rck	Max. vert. relief ____m	R (<5)	R (<25)		

- First 5 minutes: Make list of species, no sizes or counts…

Data collection – Example 1



Date: 7-6-16 Diver: PMA Training ☐ Photographer ☒ Camera #: 18 Site: OAH-752
Dive #: 2 Buddy: KDG Visibility (m): _____ Current: None Slight Mod High

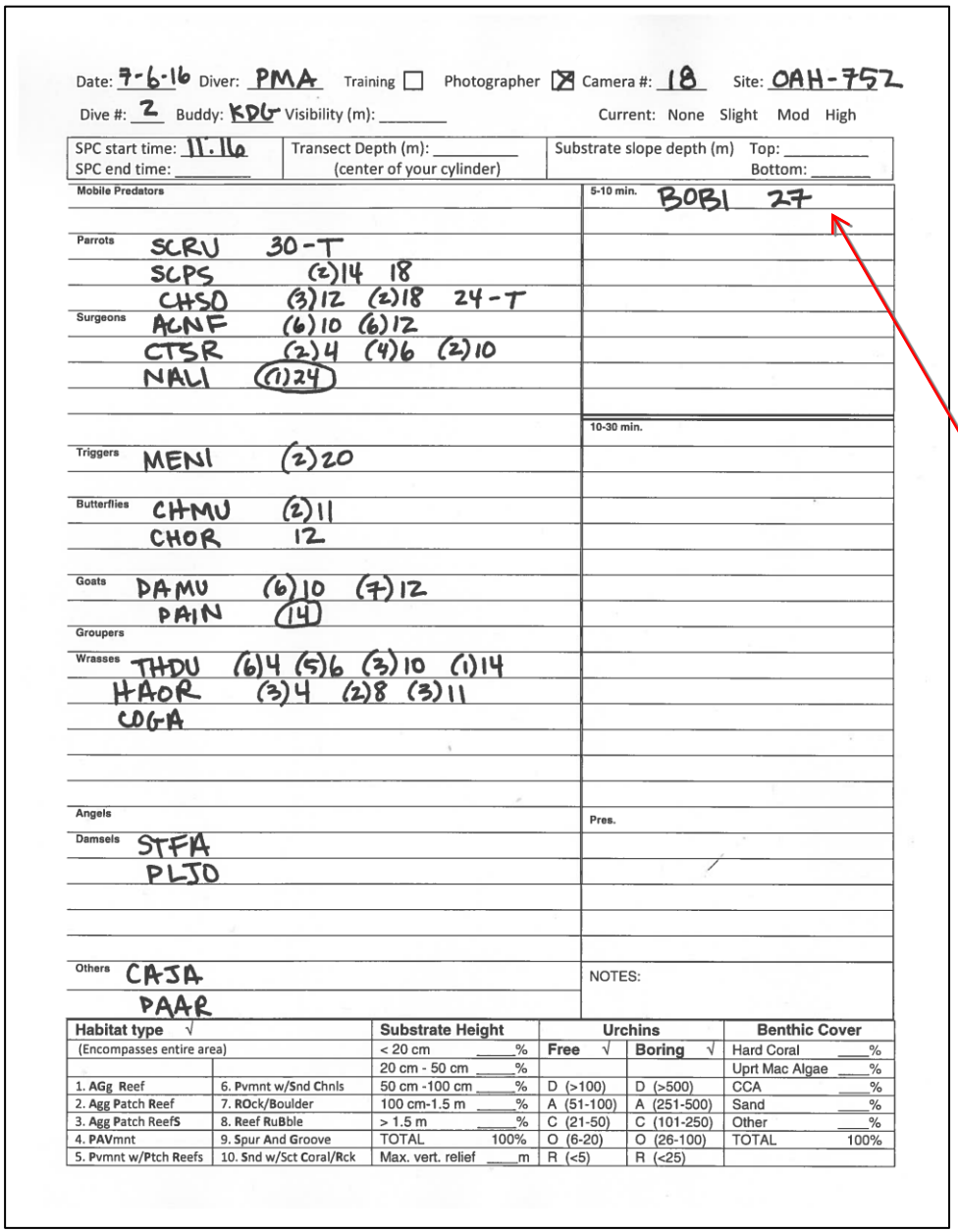
SPC start time: 11:16 SPC end time: _____	Transect Depth (m): _____ (center of your cylinder)	Substrate slope depth (m) Top: _____ Bottom: _____

	5-10 min.
Mobile Predators	
Parrots SCRU 30-T	
SCPS (2)14 18	
CHSO (3)12 (2)18 24-T	
Surgeons ACNF (6)10 (6)12	
CTSR (2)4 (4)6 (2)10	
NALI (1)24	
	10-30 min.
Triggers MENI	
Butterflies CHMU	
CHOR	
Goats PAMU	
PAIN	
Groupers	
Wrasses THDU	
HAOR	
COGA	
Angels	Pres.
Damsels STFA	
PLJO	
Others CAJA	NOTES:
PAAR	

Habitat type √ (Encompasses entire area)		Substrate Height	Urchins Free √	Urchins Boring √	Benthic Cover
		< 20 cm ____%			Hard Coral ____%
		20 cm - 50 cm ____%			Uprt Mac Algae ____%
1. AGg Reef	6. Pvmnt w/Snd Chnls	50 cm -100 cm ____%	D (>100)	D (>500)	CCA ____%
2. Agg Patch Reef	7. ROck/Boulder	100 cm-1.5 m ____%	A (51-100)	A (251-500)	Sand ____%
3. Agg Patch ReefS	8. Reef RuBble	> 1.5 m ____%	C (21-50)	C (101-250)	Other ____%
4. PAVmnt	9. Spur And Groove	TOTAL 100%	O (6-20)	O (26-100)	TOTAL 100%
5. Pvmnt w/Ptch Reefs	10. Snd w/Sct Coral/Rck	Max. vert. relief ____m	R (<5)	R (<25)	

- First 5 minutes: Make a list of species
- After 5 minutes: Starting at top, size and count fish by family.
  - This is **instantaneous** data.
- If a listed species on the list is not present during the sizing and counting stage give a best estimate from the original sighting and circle the data.
  - This is **non-instantaneous** data.

Data collection – Example 1



Date: 7-6-16 Diver: PMA Training ☐ Photographer ☒ Camera #: 18 Site: OAH-752
Dive #: 2 Buddy: KDG Visibility (m): _____ Current: None Slight Mod High

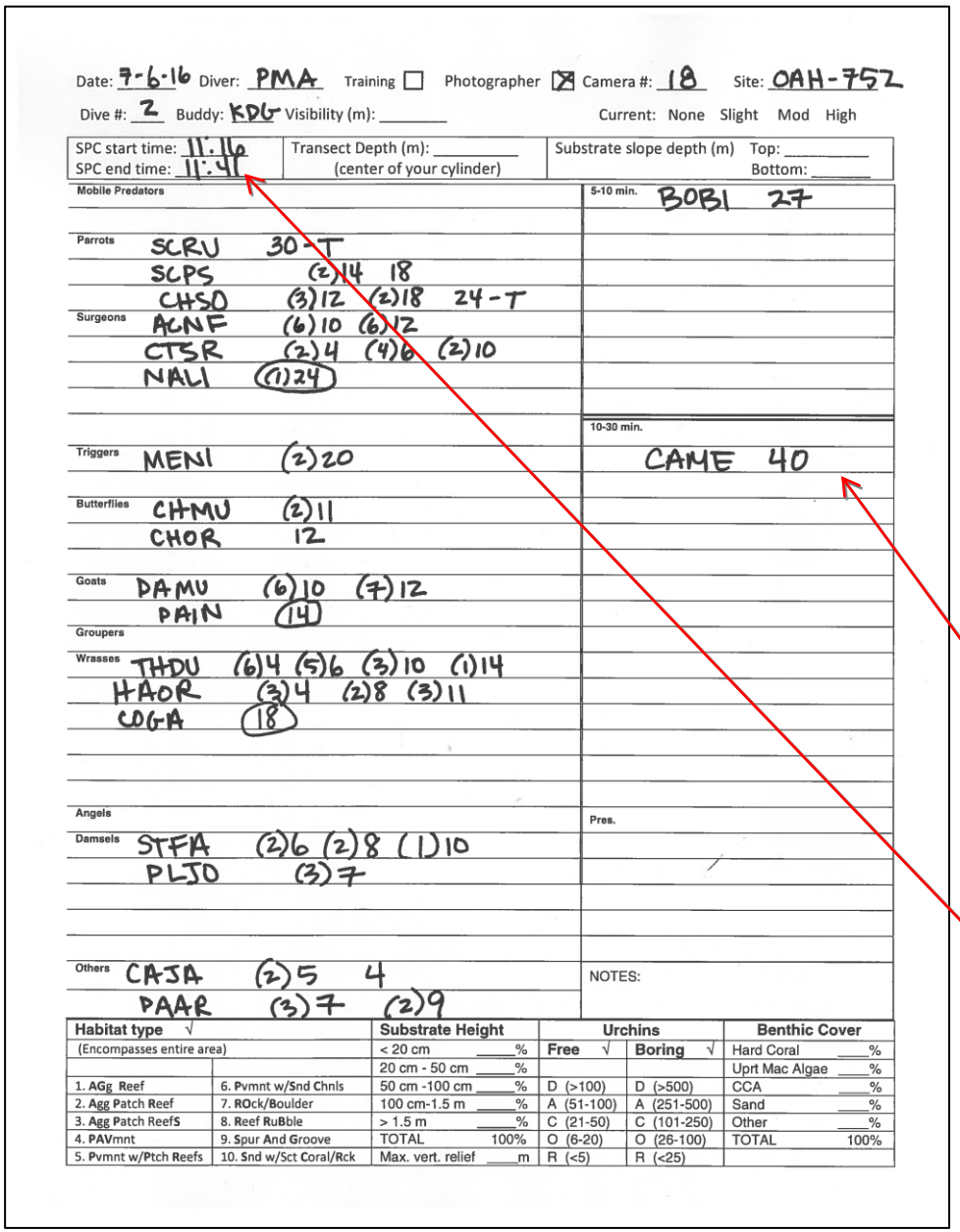
SPC start time: 11:16 SPC end time: _____ | Transect Depth (m): _____ (center of your cylinder) | Substrate slope depth (m) Top: _____ Bottom: _____

		5-10 min.	10-30 min.
Mobile Predators		BOBI 27	
Parrots	SCRU 30-T		
	SCPS (2)14 18		
	CHSO (3)12 (2)18 24-T		
Surgeons	ACNF (6)10 (6)12		
	CTSR (2)4 (4)6 (2)10		
	NALI (1)24		
Triggers	MENI (2)20		
Butterflies	CHMU (2)11		
	CHOR 12		
Goats	PAMU (6)10 (7)12		
	PAIN (14)		
Groupers			
Wrasses	THDU (6)4 (5)6 (3)10 (1)14		
	HAOR (3)4 (2)8 (3)11		
	COGA		
Angels		Pres.	
Damsels	STFA		
	PLJO		
Others	CAJA	NOTES:	
	PAAR		

Habitat type √ (Encompasses entire area)		Substrate Height		Urchins Free √	Urchins Boring √	Benthic Cover	
		< 20 cm	____%			Hard Coral	____%
		20 cm - 50 cm	____%			Uprt Mac Algae	____%
1. AGg Reef	6. Pvmnt w/Snd Chnls	50 cm -100 cm	____%	D (>100)	D (>500)	CCA	____%
2. Agg Patch Reef	7. ROck/Boulder	100 cm-1.5 m	____%	A (51-100)	A (251-500)	Sand	____%
3. Agg Patch ReefS	8. Reef RuBble	> 1.5 m	____%	C (21-50)	C (101-250)	Other	____%
4. PAVmnt	9. Spur And Groove	TOTAL	100%	O (6-20)	O (26-100)	TOTAL	100%
5. Pvmnt w/Ptch Reefs	10. Snd w/Sct Coral/Rck	Max. vert. relief	____m	R (<5)	R (<25)		

- First 5 minutes: Make a list of species
- After 5 minutes: Starting at top, size and count fish by family.
  - These is instantaneous data.
- If a listed species on the list is not present during the sizing and counting stage give a best estimate from the original sighting and circle the data.
  - This is non-instantaneous data.
- Continue systematically down your list, sizing and counting. If a new fish enters in this **5-10** minute period, write the sizes and counts on the upper right of your sheet.

Data collection – Example 1



Date: 7-6-16 Diver: PMA Training ☐ Photographer ☒ Camera #: 18 Site: OAH-752
Dive #: 2 Buddy: KDG Visibility (m): _____ Current: None Slight Mod High

SPC start time: 11:16
SPC end time: 11:41
Transect Depth (m): _____ (center of your cylinder)
Substrate slope depth (m) Top: _____ Bottom: _____

		5-10 min.	10-30 min.
Mobile Predators		BOBI 27	
Parrots	SCRU 30-T		
	SCPS (2)14 18		
	CHSO (3)12 (2)18 24-T		
Surgeons	ACNF (6)10 (6)12		
	CTSR (2)4 (4)6 (2)10		
	NALI (1)24		
Triggers	MENI (2)20		CAME 40
Butterflies	CHMU (2)11		
	CHOR 12		
Goats	PAMU (6)10 (7)12		
	PAIN (14)		
Groupers			
Wrasses	THDU (6)4 (5)6 (3)10 (1)14		
	HAOR (3)4 (2)8 (3)11		
	COGA (18)		
Angels			
Damsels	STFA (2)6 (2)8 (1)10	Pres.	
	PLJO (3)7		
Others	CAJA (2)5 4	NOTES:	
	PAAR (3)7 (2)9		

Habitat type √ (Encompasses entire area)		Substrate Height	Urchins Free √	Urchins Boring √	Benthic Cover
		< 20 cm ____%			Hard Coral ____%
		20 cm - 50 cm ____%			Uprt Mac Algae ____%
1. AGg Reef	6. Pvmnt w/Snd Chnls	50 cm -100 cm ____%	D (>100)	D (>500)	CCA ____%
2. Agg Patch Reef	7. ROck/Boulder	100 cm-1.5 m ____%	A (51-100)	A (251-500)	Sand ____%
3. Agg Patch ReefS	8. Reef RuBble	> 1.5 m ____%	C (21-50)	C (101-250)	Other ____%
4. PAVmnt	9. Spur And Groove	TOTAL 100%	O (6-20)	O (26-100)	TOTAL 100%
5. Pvmnt w/Ptch Reefs	10. Snd w/Sct Coral/Rck	Max. vert. relief ____m	R (<5)	R (<25)	

- First 5 minutes: Make a list of species
- After 5 minutes: Starting at top, size and count fish by family.
  - These is instantaneous data.
- If a listed species on the list is not present during the sizing and counting stage give a best estimate from the original sighting and circle the data.
  - This is non-instantaneous data.
- Continue systematically down your list, sizing and counting. If a new fish enters in this 5-10 minute period, write the sizes and counts on the upper right of your sheet.
- Between **10** minutes and the end of your survey (but not more than a total of 30 minutes) any new species that enter your cylinder are added on the right in the 10-30 min section.
- Once you size and count the last fish on the left side of your sheet, record this SPC end time before you begin your benthic estimations.

Data collection – highly mobile species

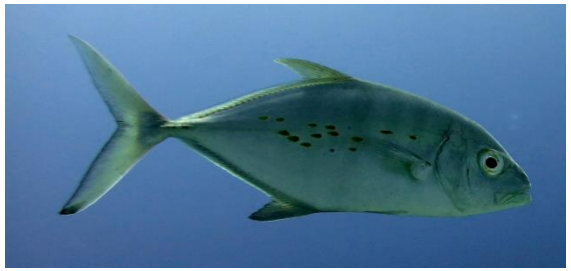
In the mentioned example, there were no “targeted” fish (mobile or rare fishes such as sharks, jacks, humphead wrasse, etc.) during the first 5 minutes.

Often, these types fish are seen in the first 5 minutes but don’t return. You record them as non-instantaneous (circled), but instead of waiting to “remember” them, you can take note of the number and size of the fish during that first 5 minutes and circle it. If it doesn’t return after the initial 5 minutes you have an accurate non-instantaneous count.

If the fish IS in your cylinder during the tallying period (after the initial 5 minutes) at the moment you’ve reached it on your data sheet, cross out your previous notes and enter the current size and numbers.

The next slides provide an example of these mobile species and what to do when they enter your cylinder during the first 5 minutes.

Examples of highly mobile species

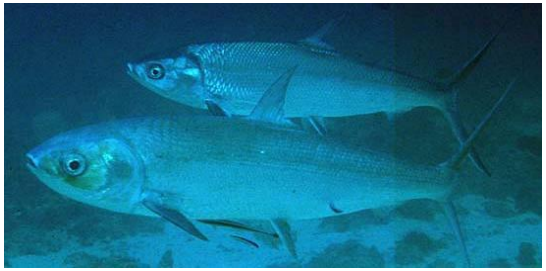


Jacks

Barracuda

Lyretail grouper

Sharks



Milkfish

Green jobfish

Humphead wrasse

Emperors

Bumphead parrotfish

With experience, you may be able to expand this list to perhaps include other families, like some parrotfish or surgeonfish. For now, concentrate on just these.

Data collection – Example 2

- First 5 minutes: Make species list. Size and circle only mobile/rare species.

Date: 8-15-16 Diver: PMA Training ☐ Photographer ☑ Camera #: 18 Site: FFS-6012

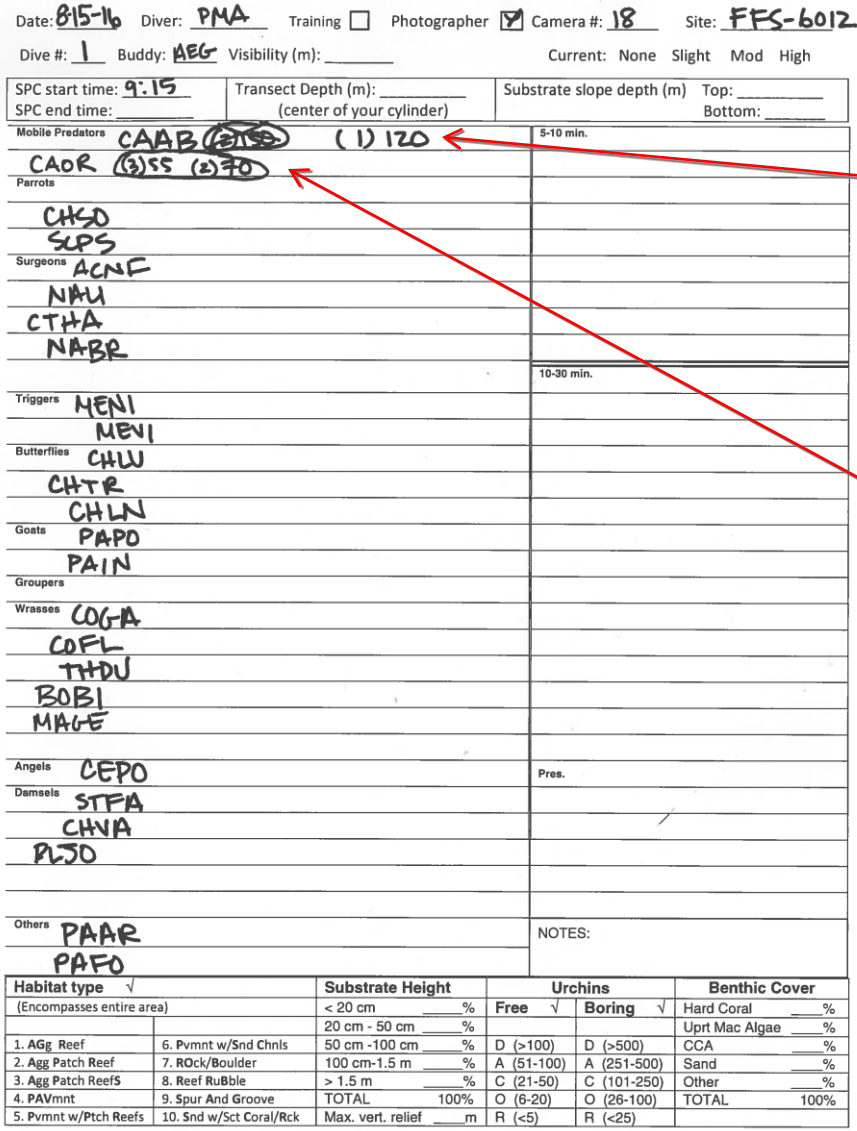
Dive #: 1 Buddy: AEG Visibility (m): _____ Current: None Slight Mod High

SPC start time: 9:15 SPC end time: _____	Transect Depth (m): _____ (center of your cylinder)	Substrate slope depth (m) Top: _____ Bottom: _____

Mobile Predators	CAAB (2)150	5-10 min.
	CAOR (3)55 (2)70	
Parrots		
	CHSO	
	SCPS	
Surgeons	ACNF	
	NAU	
	CTHA	
	NABR	
		10-30 min.
Triggers	MENI	
	MEVI	
Butterflies	CHLU	
	CHTR	
	CHLN	
Goats	PAPO	
	PAIN	
Groupers		
Wrasses	COGA	
	COFL	
	THDU	
	BOBI	
	MAGE	
Angels	CEPO	Pres.
Damsels	STFA	
	CHVA	
	PLJO	
Others	PAAR	NOTES:
	PAFO	

Habitat type √ (Encompasses entire area)		Substrate Height		Urchins Free √	Urchins Boring √	Benthic Cover	
		< 20 cm	____%			Hard Coral	____%
		20 cm - 50 cm	____%			Uprt Mac Algae	____%
1. AGg Reef	6. Pvmnt w/Snd Chnls	50 cm -100 cm	____%	D (>100)	D (>500)	CCA	____%
2. Agg Patch Reef	7. ROck/Boulder	100 cm-1.5 m	____%	A (51-100)	A (251-500)	Sand	____%
3. Agg Patch ReefS	8. Reef RuBble	> 1.5 m	____%	C (21-50)	C (101-250)	Other	____%
4. PAVmnt	9. Spur And Groove	TOTAL	100%	O (6-20)	O (26-100)	TOTAL	100%
5. Pvmnt w/Ptch Reefs	10. Snd w/Sct Coral/Rck	Max. vert. relief	____m	R (<5)	R (<25)		

Data collection – Example 2



Date: 815-16 Diver: PMA Training ☐ Photographer ☑ Camera #: 18 Site: FFS-6012

Dive #: 1 Buddy: AEG Visibility (m): _____ Current: None Slight Mod High

SPC start time: 9:15 SPC end time: _____ | Transect Depth (m): _____ (center of your cylinder) | Substrate slope depth (m) Top: _____ Bottom: _____

Mobile Predators	CAAB (2)150 (1) 120	5-10 min.
	CAOR (3)55 (2)70	
Parrots		
	CHSO	
	SCPS	
Surgeons	ACNF	
	NAU	
	CTHA	
	NABR	
		10-30 min.
Triggers	MENI	
	MEVI	
Butterflies	CHLU	
	CHTR	
	CHLN	
Goats	PAPO	
	PAIN	
Groupers		
Wrasses	COGA	
	COFL	
	THDU	
	BOBI	
	MAGE	
Angels	CEPO	Pres.
Damsels	STFA	
	CHVA	
	PLJO	
Others	PAAR	NOTES:
	PAFO	

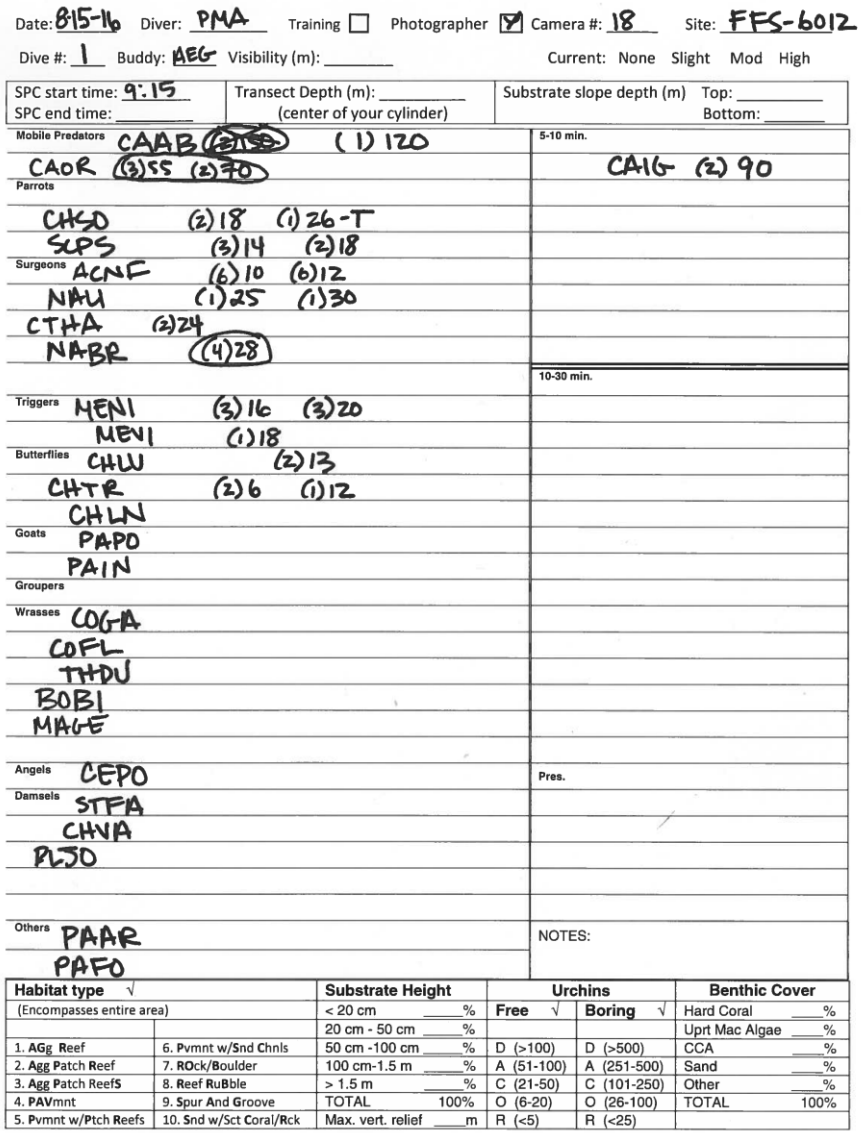
Habitat type √ (Encompasses entire area)		Substrate Height	Urchins Free √	Urchins Boring √	Benthic Cover
		< 20 cm ____%			Hard Coral ____%
		20 cm - 50 cm ____%			Uprt Mac Algae ____%
1. AGg Reef	6. Pvmnt w/Snd Chnls	50 cm -100 cm ____%	D (>100)	D (>500)	CCA ____%
2. Agg Patch Reef	7. ROck/Boulder	100 cm-1.5 m ____%	A (51-100)	A (251-500)	Sand ____%
3. Agg Patch ReefS	8. Reef RuBble	> 1.5 m ____%	C (21-50)	C (101-250)	Other ____%
4. PAVmnt	9. Spur And Groove	TOTAL 100%	O (6-20)	O (26-100)	TOTAL 100%
5. Pvmnt w/Ptch Reefs	10. Snd w/Sct Coral/Rck	Max. vert. relief ____m	R (<5)	R (<25)	

- First 5 minutes: Make species list. Size and circle only mobile/rare species.

- After 5 minutes: starting at top – in this case, CAAB (*Carcharhinus amblyrhynchos* – a shark) – look around to see if there are any in your cylinder. If there are, write the new count(s) and size(s) and cross out your circled information.
  - This data is **instantaneous**.

- Next on your list is CAOR (*Carangoides orthogrammus* – a jack). You look around your SPC cylinder and don't see any. Leave the entry as it is; it will be entered as "**non-instantaneous** " in the database.

Data collection – Example 2



Date: 8-15-16 Diver: PMA Training ☐ Photographer ☑ Camera #: 18 Site: FFS-6012

Dive #: 1 Buddy: AEG Visibility (m): _____ Current: None Slight Mod High

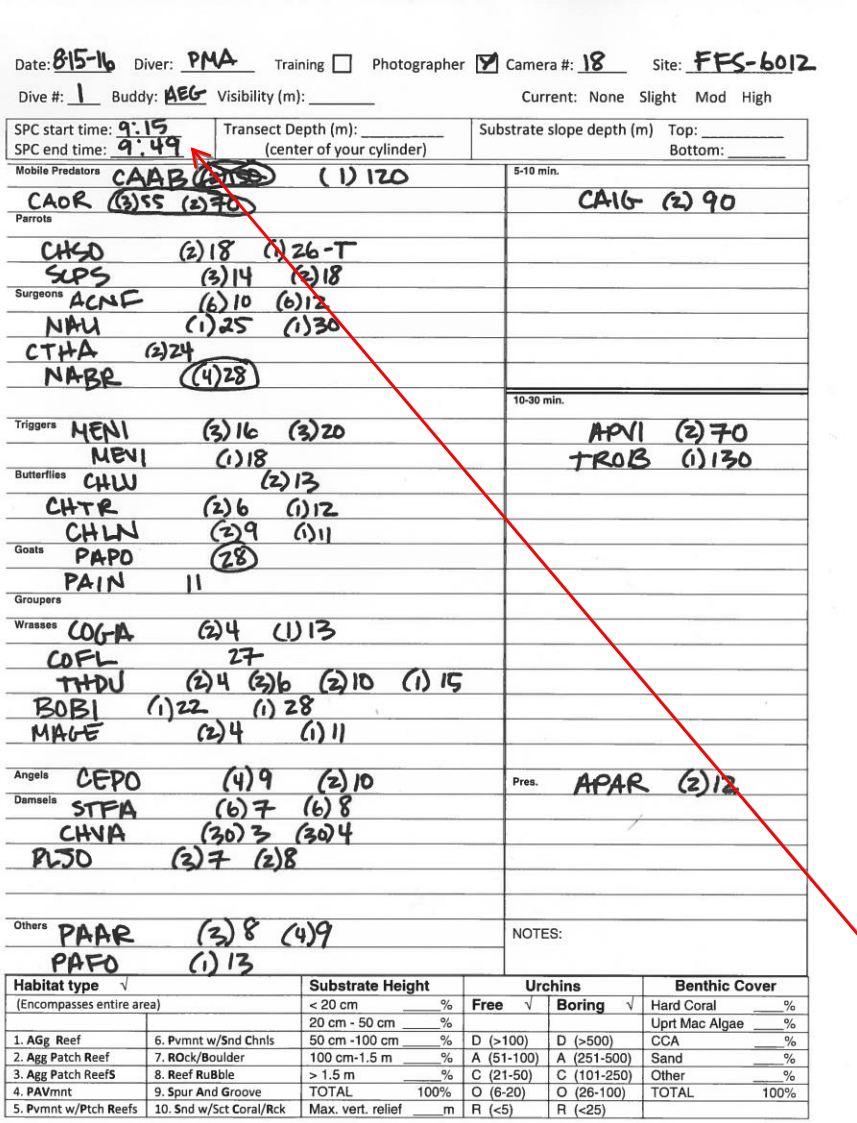
SPC start time: 9:15 SPC end time: _____ | Transect Depth (m): _____ (center of your cylinder) | Substrate slope depth (m) Top: _____ Bottom: _____

		5-10 min.
Mobile Predators	CAAB (2)150 (1)120	
	CAOR (3)55 (2)70	CAIG (2) 90
Parrots		
	CHSO (2)18 (1)26-T	
	SCPS (3)14 (2)18	
Surgeons	ACNF (6)10 (6)12	
	NAIJ (1)25 (1)30	
	CTHA (2)24	
	NABR (4)28	
		10-30 min.
Triggers	MENI (3)16 (3)20	
	MEVI (1)18	
Butterflies	CHLU (2)13	
	CHTR (2)6 (1)12	
	CHLN	
Goats	PAPO	
	PAIN	
Groupers		
Wrasses	COGA	
	COFL	
	THDU	
	BOBI	
	MAGE	
Angels	CEPO	Pres.
Damsels	STFA	
	CHVA	
	PLSO	
Others	PAAR	NOTES:
	PAFO	

Habitat type √		Substrate Height		Urchins		Benthic Cover	
(Encompasses entire area)		< 20 cm	____%	Free √	Boring √	Hard Coral	____%
		20 cm - 50 cm	____%			Uprt Mac Algae	____%
1. AGg Reef	6. Pvmnt w/Snd Chnls	50 cm -100 cm	____%	D (>100)	D (>500)	CCA	____%
2. Agg Patch Reef	7. ROck/Boulder	100 cm-1.5 m	____%	A (51-100)	A (251-500)	Sand	____%
3. Agg Patch ReefS	8. Reef RuBble	> 1.5 m	____%	C (21-50)	C (101-250)	Other	____%
4. PAVmnt	9. Spur And Groove	TOTAL	100%	O (6-20)	O (26-100)	TOTAL	100%
5. Pvmnt w/Ptch Reefs	10. Snd w/Sct Coral/Rck	Max. vert. relief	____m	R (<5)	R (<25)		

- First 5 minutes: Make species list. Size and circle only mobile/rare species.
- After 5 minutes: Starting at top – in this case, CAAB (*Carcharhinus amblyrhynchos* – a shark) – look around to see if there are any in your cylinder. If there are, write in this new count(s) and size(s) and cross out your circled information.
  - This data is instantaneous.
- Next on your list is CAOR (*Carangoides orthogrammus* – a jack). You look around your SPC cylinder and don't see any. Leave the entry as it is; it will be entered as "non-instantaneous" in the database.
- Continue down your sheet as outlined in Example 1, sizing and counting fish, circling the ones you have to "remember" and adding brand new species on the right, either between **5-10** min or **10 -30** min.

Data collection – Example 2



Date: 8-15-16 Diver: PMA Training ☐ Photographer ☑ Camera #: 18 Site: FFS-6012

Dive #: 1 Buddy: AEG Visibility (m): _____ Current: None Slight Mod High

SPC start time: 9:15
SPC end time: 9:49

Transect Depth (m): _____ (center of your cylinder)

Substrate slope depth (m) Top: _____ Bottom: _____

Mobile Predators
CAAB (3)150 (1)120
CAOR (3)55 (2)70

Parrots
CHSO (2)18 (1)26-T
SCPS (3)14 (2)18

Surgeons
ACNC (6)10 (6)12
NAIJ (1)25 (1)30
CTHA (2)24
NABR (4)28

Triggers
MEN1 (3)16 (3)20
MEVI (1)18

Butterflies
CHLN (2)13
CHTR (2)6 (1)12
CHLN (3)9 (1)11

Goats
PAPO (28)
PAIN 11

Groupers

Wrasses
COGA (2)4 (1)13
COFL 27
THDU (2)4 (3)6 (2)10 (1)15
BOBI (1)22 (1)28
MAGE (2)4 (1)11

Angels
CEPO (4)9 (2)10

Damsels
STFA (6)7 (6)8
CHVA (30)3 (30)4
PLSO (3)7 (2)8

Others
PAAR (3)8 (4)9
PAFO (1)13

5-10 min.
CAIG (2)90

10-30 min.
APVI (2)70
TROB (1)130

Pres. APAR (2)12

NOTES:

Habitat type √		Substrate Height	Urchins		Benthic Cover
(Encompasses entire area)		< 20 cm ____%	Free √	Boring √	Hard Coral ____%
		20 cm - 50 cm ____%			Uprt Mac Algae ____%
1. AGg Reef	6. Pvmnt w/Snd Chnls	50 cm -100 cm ____%	D (>100)	D (>500)	CCA ____%
2. Agg Patch Reef	7. ROck/Boulder	100 cm-1.5 m ____%	A (51-100)	A (251-500)	Sand ____%
3. Agg Patch ReefS	8. Reef RuBble	> 1.5 m ____%	C (21-50)	C (101-250)	Other ____%
4. PAVmnt	9. Spur And Groove	TOTAL 100%	O (6-20)	O (26-100)	TOTAL 100%
5. Pvmnt w/Ptch Reefs	10. Snd w/Sct Coral/Rck	Max. vert. relief ____m	R (<5)	R (<25)	

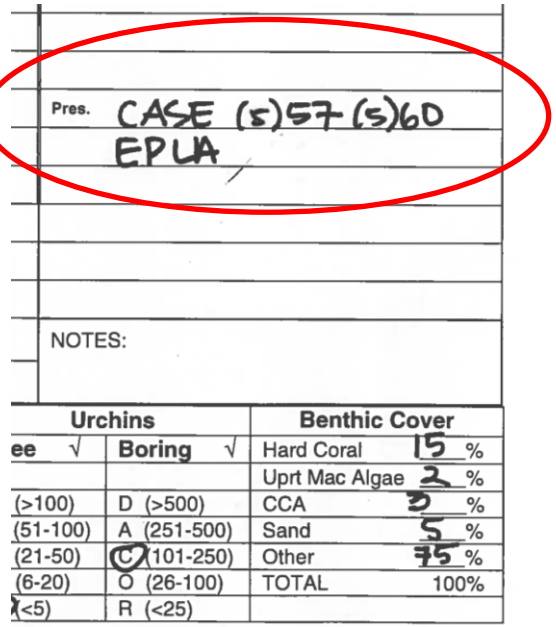
- First 5 minutes: Make species list. Size and circle only mobile/rare species.
- After 5 minutes: Starting at top – in this case, CAAB (*Carcharhinus amblyrhynchos* – a shark) – look around to see if there are any in your cylinder. If there are, write in this new count(s) and size(s) and cross out your circled information.
  - This data is instantaneous.
- Next on your list is CAOR (*Carangoides orthogrammus* – a jack). You look around your SPC cylinder and don't see any. Leave the entry as it is; it will be entered as "non-instantaneous" in the database.
- Continue down your sheet as outlined in Example 1, sizing and counting fish, circling the ones you have to "remember" and adding brand new species on the right, either between 5-10 min or 10-30 min.
- Once you're done, write in the ending time.

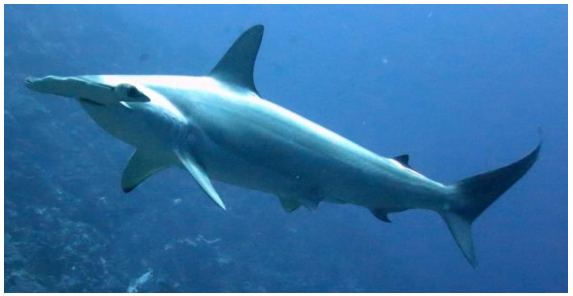
Presence data

Presence data **(P)** is for fish seen outside of your cylinder and can be collected at any time during the survey, and if you're confident in the accuracy of your sizing, you can include size estimations.

You can also record just the presence of the species, with no counts or sizes (put "0" in the database).

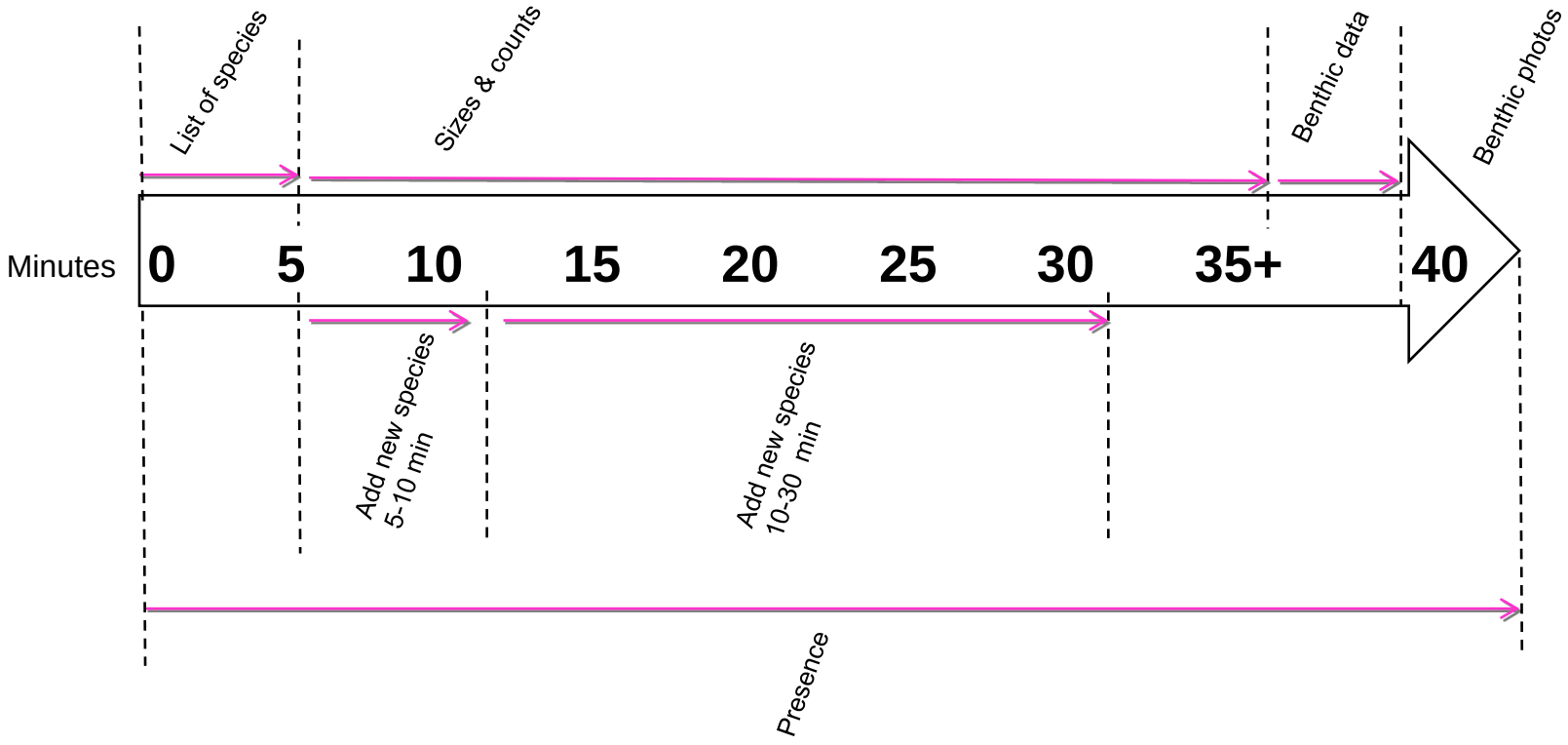
Focus on targeted or rare species, such as targeted parrotfish, sharks, jacks, tuna, etc.





Review of method

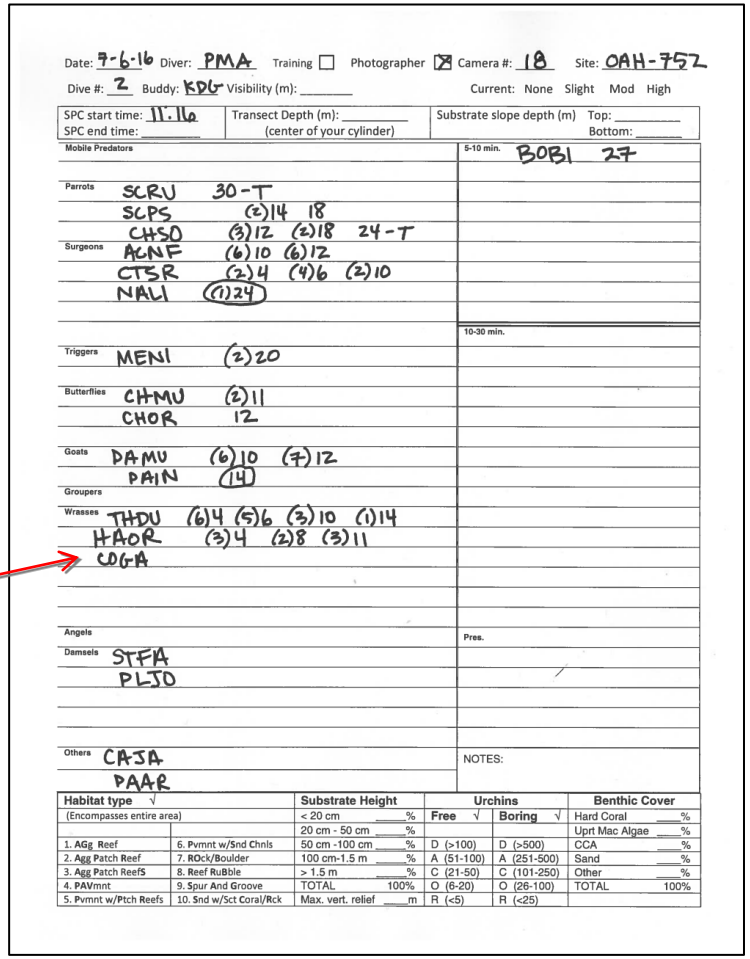
- List of species – First 5 minutes
- Sizes and counts – after 5 minutes
  - Add new species on right (5-10 min and 10-30 min)
  - Circle species you have to “remember”
  - Fish seen outside the SPC cylinders can be added as Presence
- Collect benthic data; take photos (#4 Benthic Habitat Surveys)



Additional tips and rules

- Once you've started the sizing and counting part, you won't ever go back and add additional sizes and counts to a previously counted species.

- For instance, if you've reached COGA on your data sheet and you then see 4 NALIs at size 28 and 2 SCRUs at size 22, you would not record them; they've already been counted.



Date: 7-6-16 Diver: PMA Training ☐ Photographer ☒ Camera #: 18 Site: OAH-752
Dive #: 2 Buddy: KDG Visibility (m): _____ Current: None Slight Mod High

SPC start time: 11:16 SPC end time: _____ | Transect Depth (m): _____ (center of your cylinder) | Substrate slope depth (m) Top: _____ Bottom: _____

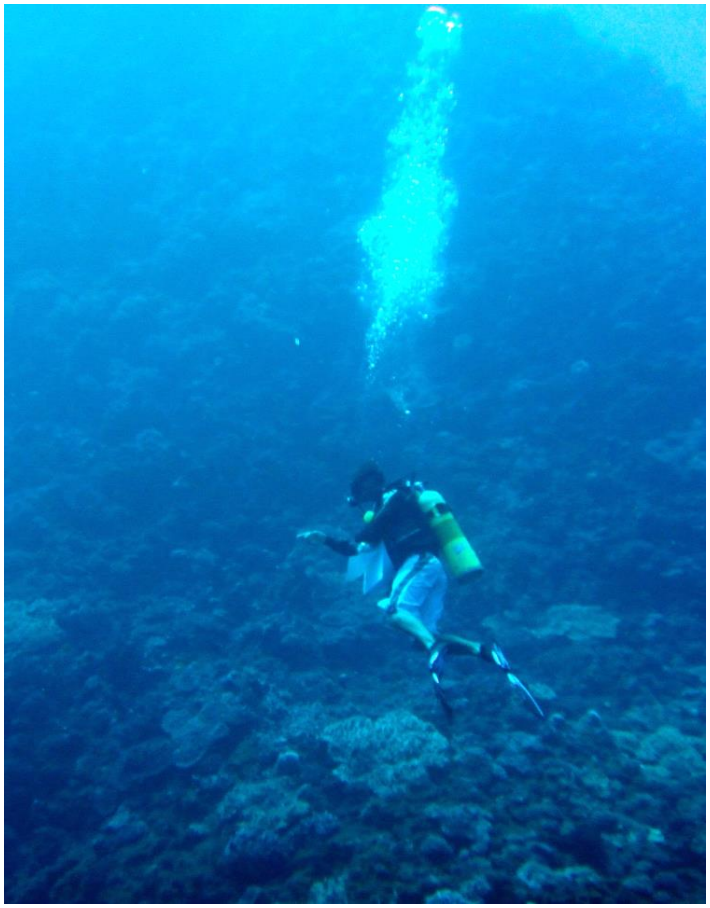
		5-10 min.	10-30 min.
Mobile Predators		BOBI 27	
Parrots	SCRU 30-T		
	SCPS (2)14 18		
	CHSO (3)12 (2)18 24-T		
Surgeons	ACNF (6)10 (6)12		
	CTSR (2)4 (4)6 (2)10		
	NALI (1)24		
Triggers	MENI (2)20		
Butterflies	CHMU (2)11		
	CHOR 12		
Goats	PAMU (6)10 (7)12		
	PAIN (14)		
Groupers			
Wrasses	THDU (6)4 (5)6 (3)10 (1)14		
	HAOR (3)4 (2)8 (3)11		
	COGA		
Angels			Pres.
Damsels	STFA		
	PLJO		
Others	CAJA		NOTES:
	PAAR		

Habitat type √		Substrate Height	Urchins		Benthic Cover
(Encompasses entire area)		< 20 cm ____%	Free √	Boring √	Hard Coral ____%
		20 cm - 50 cm ____%			Uprt Mac Algae ____%
1. AGg Reef	6. Pvmnt w/Snd Chnls	50 cm -100 cm ____%	D (>100)	D (>500)	CCA ____%
2. Agg Patch Reef	7. ROck/Boulder	100 cm-1.5 m ____%	A (51-100)	A (251-500)	Sand ____%
3. Agg Patch ReefS	8. Reef RuBble	> 1.5 m ____%	C (21-50)	C (101-250)	Other ____%
4. PAVmnt	9. Spur And Groove	TOTAL 100%	O (6-20)	O (26-100)	TOTAL 100%
5. Pvmnt w/Ptch Reefs	10. Snd w/Sct Coral/Rck	Max. vert. relief ____m	R (<5)	R (<25)	

Additional tips and rules

Keep your focus up, and not down into the reef as much as possible to not miss roving fish, especially during the 5-minute listing of species.

- Later you can look more closely at the bottom for the smaller, more cryptic species.
  - But try not to “mow the lawn” to count every single little fish.
  - If the habitat is homogenous, it is acceptable to count a species in a subset of your cylinder, e.g. ¼ of the area, and extrapolate.



Additional tips and rules

Keep your fins and other parts of your body off the bottom, not only to prevent damage to coral or other marine life, but also to prevent stirring up rocks or sand, which could attract some fishes and bias your counts.

Additional tips and rules

What if you're not sure what species you're looking at, though you know the family or genus?

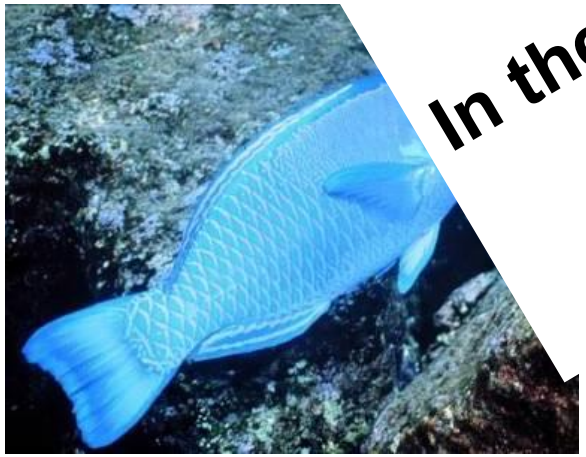
- Try to look for identifying features, but if you're not sure, don't guess.
- Take a picture or make a drawing, then look it up and /or discuss with other divers.
- If you know the genus but not the species, use the genus name with sp, e.g., *Chlorurus sp (*CLSP – NOT CHSP, that's Cheilodipterus sp) or *Scarus sp* (SCSP).
- If you know the family but not the genus, use the family, e.g., Scaridae. In the database these are listed under the first four letters of the common family name, so for Scaridae it would be PARR.

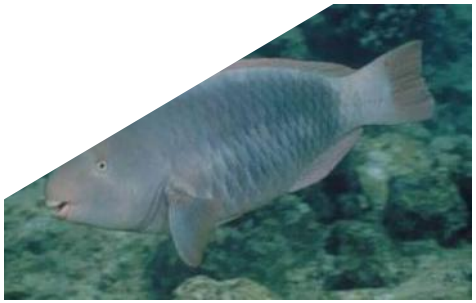
Additional tips and rules

Terminal-phase parrotfish distinguished from initial- or juvenile-phase parrots by writing a “T” next to the size

Date 9-14-10	Diver PMA	Buddy KSM	Site
Rep A Vis: 20 m	Start: 9 : 15 End: ___ : ___		Rep
Transect depth: 12 m	Slope: Min depth: ____m Max depth: ____m		Tran
MOBILE PREDATORS			MOB
PARROTS SCPS (2) 11			PAR
CHSO (2) 36-T (4) 12	(11) 8		
SURGEONS			

In the MHI and NWHI only!

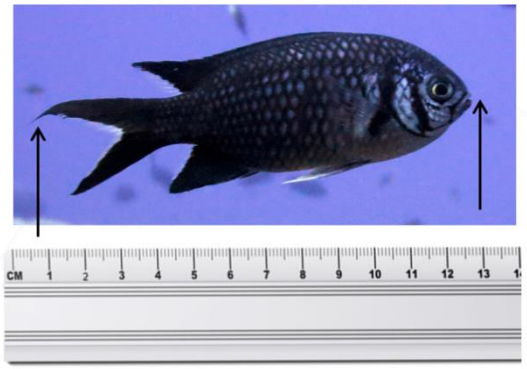




Additional tips and rules

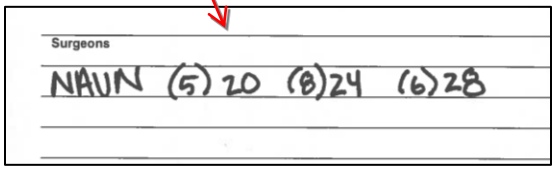
Sizing:

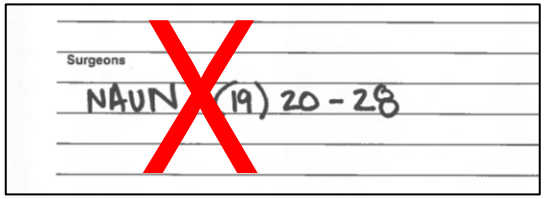
- Use total length (to the nearest cm): tip of snout to tip of caudal fin



Counting:

- Each size category should have its own count, not a range.





See the next presentation “#2 – Fish Sizing and Counting” for more details